

REGIONAL COMPETITION - ROUND 14

TOSS-UP

1. ERSC; Multiple Choice: The most abundant rock type in the continental crust is:
- a) granite
 - b) basalt
 - c) sandstone
 - d) shale

ANSWER: A--GRANITE

BONUS

1. ERSC; Multiple Choice: Most limestones formed as:
- a) chemical precipitates from warm, tropical oceans
 - b) accumulations of detritus from adjacent land masses
 - c) accumulations of plant and animal remains
 - d) accumulations of volcanic ejecta

ANSWER: C--ACCUMULATIONS OF PLANT AND ANIMAL REMAINS

TOSS-UP

2. BIOL; Multiple Choice: The organism which is a combination of fungi and algae is called:
- a) mushroom
 - b) fern
 - c) lichen
 - d) mold

ANSWER: C--LICHEN

BONUS

2. BIOL; Multiple Choice: Pollen granules are released from a flower's:
- a) petals
 - b) sepals
 - c) carpel
 - d) anther

ANSWER: D--ANTHER

TOSS-UP

3. COMP; Multiple Choice: What are the main parts of a CPU?
- a) Memory and cards
 - b) Control Unit and Bus
 - c) ALU and Control Unit
 - d) Buss and registers

ANSWER: C--ALU AND CONTROL UNIT

BONUS

3. COMP; Short Answer: Name the three Central Processing Unit (CPU) busses.

ANSWER: ADDRESS, CONTROL, DATA

TOSS-UP

4. PHYS; What physicist, after whom a very important physical constant is named, formulated the quantum theory?

ANSWER: (MAX) PLANCK

BONUS

4. PHYS; Multiple Choice: Although the solar spectrum is representative of a 300 degree celsius black body, the solar spectrum observed by instruments at the ground is not. What is the principal process causing this difference?
- a) energy absorption by molecules of atmospheric gases
 - b) short wavelength emittance by atmospheric gases
 - c) scattering of solar energy by clouds
 - d) absorption by ozone

ANSWER: A--ENERGY ABSORPTION BY MOLECULES OF ATMOSPHERIC GASES

TOSS-UP

5. GENR; Short Answer: In the core of a nuclear reactor, the process of slowing down or thermalizing neutrons is called:

ANSWER: MODERATION

BONUS

5. GENR; Multiple Choice: In Fermi's first reactor at the University of Chicago, the substance used as a moderator was:
- a) heavy water
 - b) water
 - c) graphite
 - d) beryllium

ANSWER: C--GRAPHITE

TOSS-UP

6. CHEM; Short Answer: The empirical formula for phosphorus pentoxide, given in smallest whole numbers, has how many phosphorus atoms?

ANSWER: 2 (P₂O₅)

BONUS

6. CHEM; Short answer: Name any three rare earth elements.

ANSWER: ANY 3 OF THE FOLLOWING: CERIUM, PRASEODYMIUM, NEODYMIUM, PROMETHIUM, SAMARIUM, EUROPIUM, GADOLINIUM, TERBIUM, DYSPROSIUM, HOLMIUM, ERBIUM, THULIUM, YTTERBIUM, LUTETIUM

TOSS-UP

7. ASTR; Short Answer: Phobos is a satellite of what planet?

ANSWER: MARS

BONUS

7. ASTR; Short Answer: meteorites are divided into three main classes. Name two.

ANSWER: IRONS (SIDERITES); STONY IRONS (SIDEROLITES); STONES (AREOLITES)

TOSS-UP

8. BIOL; Multiple Choice: The organelle which contains the hereditary information for the cell is called:

- a) mitochondria
- b) nucleus
- c) RNA
- d) plastid

ANSWER: B--NUCLEUS

BONUS

8. BIOL; Short Answer: The structure in the eye which regulates the size of the pupil is called the:

ANSWER: IRIS

TOSS-UP

9. MATH; Short Answer: The number of different ways of arranging 4 different people in a straight line is:

ANSWER: TWENTY FOUR (24)

BONUS

9. MATH; Multiple Choice: A point moves so that its distance from the origin is always twice its distance from the point (3,0). Its locus is:
- a) an ellipse
 - b) a hyperbola
 - c) a circle
 - d) a parabola

ANSWER: C--A CIRCLE

TOSS-UP

10. PHYS; Multiple Choice: In nuclear fusion a deuterium nucleus and a tritium nucleus can join to form which of the following?
- a) A Helium nucleus and a proton
 - b) A Lithium nucleus
 - c) A Lithium nucleus and a neutron
 - d) A Helium nucleus and a neutron

ANSWER: D--A HELIUM NUCLEUS AND A NEUTRON

BONUS

10. PHYS; Multiple Choice: A freight car of mass 20,000 kg standing at rest is rammed by a loaded tank car with a mass of 30,000 kg. After the collision, the two cars are locked together and move off at a speed of 0.60 m/sec. What was the speed of the tank car before the collision?
- a) 0.20 m/sec
 - b) 0.75 m/sec
 - c) 1.0 m/sec
 - d) 3.6 m/sec

ANSWER: C--1.0 M/SEC

TOSS-UP

11. CHEM; Multiple Choice: Which of the following best describes the forces which hold together the secondary structure of DNA?
- a) phosphorus-oxygen bonds
 - b) covalent bonds
 - c) carbon-oxygen bonds
 - d) hydrogen bonds

ANSWER: D--HYDROGEN BONDS

BONUS

11. CHEM; Short answer: When one mole of methanol is burned to completion in air, how many grams of water are formed?

ANSWER: 36 GRAMS ($\text{CH}_3\text{OH} + 1.5 \text{ O}_2 = \text{CO}_2 + 2 \text{ H}_2\text{O}$)

TOSS-UP

12. COMP; Multiple Choice: What is the value of Temp after exiting the following loop?

INTEGER Temp, I

Temp = 5

FOR I = 4 to 6

Temp = I + Temp

NEXT I

- a) 13
- b) 20
- c) 12
- d) 15

ANSWER: B--20

BONUS

12. COMP; Multiple Choice: Add the following two numbers in binary representation.

0110

0101

- a) 0011
- b) 1100
- c) 1011
- d) 0110

ANSWER: C--1011

TOSS-UP

13. BIOL; Multiple Choice: Sensory receptors lie in this structure of the ear
- a) cochlea
 - b) hammer
 - c) anvil
 - d) stirrup

ANSWER: A--COCHLEA

BONUS

13. BIOL; Multiple Choice: Tissue culture has been used extensively as a research method in all of the following fields of biological investigation except:
- a) photosynthesis
 - b) virology
 - c) development of nerve cells
 - d) experimental embryology

ANSWER: A--PHOTOSYNTHESIS

TOSS-UP

14. ASTR; Short Answer: Which planetary system is the space probe CASSINI scheduled to explore during the late 1990's?

ANSWER: SATURN

BONUS

14. ASTR; Short Answer: Upon which Saturnian moon is the Huygens probe from the CASSINI craft scheduled to attempt a soft landing?

ANSWER: TITAN

TOSS-UP

15. PHYS; Multiple Choice: When two waves pass the same point at the same time, their amplitudes at this point always:
- a) cancel
 - b) reflect off each other
 - c) reinforce each other
 - d) superpose

ANSWER: D--SUPERPOSE

BONUS

15. PHYS; Multiple Choice: When electrical charges are accelerated in a vacuum, they will generate:
- a) sound waves
 - b) water waves
 - c) light waves
 - d) torsional waves

ANSWER: C--LIGHT WAVES

TOSS-UP

16. CHEM; Multiple Choice: Structural determinations of chemical compounds are typically done by scattering techniques. What type of radiation is used to generate the spectrum?
- a) Infra-red
 - b) Ultraviolet
 - c) Alpha
 - d) X-ray

ANSWER: D--X-RAY

BONUS

16. CHEM; Short answer: What are the two stable isotopes of boron and their relative abundances within 10%?

ANSWER: B-10 20%, B-11 80%

TOSS-UP

17. ERSC; Multiple Choice: Anorthosite is:

- a) a feldspar
- b) an igneous rock
- c) a volcanic rock
- d) a metamorphic rock

ANSWER: B--AN IGNEOUS ROCK

BONUS

17. ERSC; Multiple Choice: Metamorphic rocks:

- a) have undergone changes in chemical composition without changing mineral assemblages
- b) have undergone changes in mineral assemblages without changing chemical composition
- c) form by cooling from a magma
- d) form as accumulations of volcanic ejecta

ANSWER: B--HAVE UNDERGONE CHANGES IN MINERAL ASSEMBLAGES WITHOUT CHANGING CHEMICAL COMPOSITION

TOSS-UP

18. GENR; Short Answer: In fluid dynamics, the dimensionless number representing the ratio between inertial and viscous forces is called:

ANSWER: THE REYNOLDS NUMBER

BONUS

18. GENR; Multiple Choice: The Reynolds number is used to indicate when a flow becomes turbulent. In an internal flow, i.e., flow in a pipe, what order of magnitude Reynolds number indicates the onset of turbulence?

- a) 100
- b) 1000
- c) 10,000
- d) 100,000

ANSWER: B -- 1000

TOSS-UP

19. PHYS; Multiple Choice: An object is allowed to fall freely near the surface of a planet. The object falls 54 meters in the first 3.0 second after it is released. The acceleration due to gravity on that planet is:
- a) 6.0 m/s²
 - b) 12 m/s²
 - c) 27 m/s²
 - d) 108 m/s²

ANSWER: B--12 M/S²

BONUS

19. PHYS; Short Answer: Consider twenty lamps of 400 ohms each connected in parallel on a 110 volt circuit. How much current is drawn?

ANSWER: 5.5 AMPS

TOSS UP

20. BIOL; Short Answer: Recently, researchers identified the gene that is at fault in the hereditary disease known scientifically as X-linked severe combined immunodeficiency. What is the common name for this disease?

ANSWER: BUBBLE BOY DISEASE (BECAUSE VICTIMS HAVE TO REMAIN ISOLATED IN A PLASTIC BUBBLE)

BONUS

20. BIOL; Multiple Choice: Transduction is a term applied to a method of:
- a) liquid transfer in vascular plants
 - b) electrolyte diffusion through a cell membrane
 - c) oxygen absorption of a red corpuscle
 - d) genetic transmission in bacteria

ANSWER: D--GENETIC TRANSMISSION IN BACTERIA

TOSS-UP

21. CHEM; Short answer: When Watson & Crick hydrolyzed DNA, what relationship did they find to exist between the amounts of bases they detected? Be specific with base names.

ANSWER: AMOUNT OF ADENINE (ADENOSINE) = AMOUNT OF THYMINE (THYMIDINE)
AMOUNT OF GUANINE (GUANOSINE) = AMOUNT OF CYTOSINE (CYTIDINE)

BONUS

21. CHEM; Multiple Choice: The elements found naturally on Earth have isotopes of all mass numbers from 1 to 238 except for what two mass numbers:
- a) 5 and 8
 - b) 7 and 9
 - c) 35 and 37
 - d) 107 and 109

ANSWER: A-- MASS NUMBERS 5 AND 8

TOSS-UP

22. PHYS; Short Answer: A steel wire is 20 cm long, has a diameter of 0.5 cm and density of 9.0 g/cm³. It is held taut by a force of 100 N. When plucked, the fundamental has a frequency of 400 Hz. If the force is increased to 400N, what will the frequency be?

ANSWER: 800 HZ

BONUS

22. PHYS; Short Answer: A 200 N box must be lifted onto a 6 m platform. If a pulley system reduces the force to 50 N and there is 80% efficiency, what is the displacement of the rope?

ANSWER: 30 M

TOSS-UP

23. MATH; Short Answer: How many days will it be before a conventional analog clock, losing 30 minutes a day, shows the right time again?

ANSWER: TWENTY-FOUR

BONUS

23. MATH; Short Answer: How do you write 99 in Roman numerals?

ANSWER: XCIX

TOSS-UP

24. BIOL; Multiple Choice: The largest number of species of any group in the animal kingdom is found in the class:

- a) crustacea
- b) insects
- c) mammalia
- d) myriapoda

ANSWER: B-- INSECTS

BONUS

24. BIOL; Short Answer: What part of the brain is banana-shaped and plays a roll in memory?

ANSWER: HIPPOCAMPUS

TOSS-UP

25. CHEM; Multiple Choice: Which one of the following characteristics do the elements sodium, aluminum, fluorine, manganese and arsenic have in common? They all:
- a) have a metallic nature
 - b) are a solid or liquid under standard conditions of temperature and pressure
 - c) have only one naturally occurring isotope
 - d) are strongly electropositive

ANSWER: C--HAVE ONLY ONE NATURALLY OCCURRING ISOTOPE

BONUS

25. CHEM; Multiple Choice: Which of the following solutions will have the highest pH:
- a) 2% acetic acid in water
 - b) 2% nitric acid in water
 - c) 2% sulfuric acid in water
 - d) 2% boric acid in water

ANSWER: D-- 2% BORIC ACID IN WATER
